

- Salomon, G., & Snow, R. E. (Eds.) Commentaries on research in instructional media. An examination of conceptual schemes. *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46.
- Snow, R. E. Research on media and aptitudes. In G. Salomon & R. E. Snow. (Eds.), *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46, 63-89.
- Shuiman, L. S. Reconstruction of educational research. *Review of Educational Research*, 1970, 40, 371-396.

APPLICATIONS OF THE ATI APPROACH

- Barker, R. G. Ecological psychology. Stanford, Calif.: Stanford University Press, 1968.
- Becker, A. D. Verbal ability and visual verbal codes of presentation in the acquisition of a poetic concept. Unpublished doctoral dissertation, University of Southern California, 1974.
- Bransford, J. D., & McCarrell, N. S. A sketch of a cognitive approach to comprehension. Some thoughts about understanding what it means to comprehend. In W. B. Weimer & D. S. Palermo (Eds.), *Cognition and the symbolic processes*. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1975. Pp. 189-230.
- Clark, R. E. Predecisional information seeking as a function of interactions between subjective response uncertainty, dogmatism, and locus of control. Unpublished doctoral dissertation, Indiana University, Bloomington, 1970.
- Craik, K. H. Environmental psychology. In P. H. Mussen & M. R. Rosenzweig (Eds.), *Annual review of psychology* Vol. 24. Palo Alto, Calif.: Annual Reviews Inc., 1973, Pp. 403-422.
- Cronbach, L. J. How can instruction be adapted to individual differences? In R. M. Gagné (Ed.), *Learning and individual differences*. Columbus, Ohio: Charles E. Merrill, 1967. Pp. 23-29.
- Cronbach, L. J. The logic of experiments on discovery. In L. S. Shulman & E. R. Keislar (Eds.), *Learning by discovery. A critical appraisal*. Chicago: Rand McNally, 1966. Pp. 77-92.
- Eckhardt, W. W., Jr. Learning in multi-media programed instruction as a function of aptitude and instruction rate controlled by compressed speech. Unpublished doctoral dissertation, University of Southern California, 1970.
- Gagné, R. M. (Ed.). *Learning and individual differences*. Columbus, Ohio: Charles E. Merrill, 1967.

Sources of Information about Aptitude-Treatment Interactions

Edited by Richard E. Clark

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

INTRODUCTION

So many bibliographies have been offered in instructional technology that the obvious question is why another one is necessary. Instructional technology bibliographies typically provide lists of research surveys or "how to" monographs on various media or techniques of instruction. This list presents an in-depth survey of books, monographs, and articles on a specific approach to a systematic way of thinking about instruction. Essentially, aptitude-treatment interactions (ATIs) are one way of solving educational problems. The method makes the assumption that all educational outcomes are a function of interactions between characteristics of students on the one hand, and the matching characteristics of instructional techniques on the other hand; i.e., all learning is assumed to be the result of interactions between students and teaching methods and/or media.

Another reason for offering this bibliography at this time is that recent reviews of educational technology and communications research generally have been depressing. Too many studies simply have not contributed either to educational practice or to the growth of good theories. The ATI model may provide an alternative way to think about some of the questions that plague educators.

The idea is not new, of course. Forty years ago Kurt Lewin suggested the model in his classic formula "Behavior results

©1975

Association for Educational Communications and Technology
1201 16th Street NW
Washington, D.C. 20036

Although the ATI method may now be more useful to the researcher than the practitioner it is offered in the hopes that it will eventually improve instruction. Most important for those concerned with instructional technology and media is the potential of the ATI model for helping us to overcome Lee Shulman's valid criticism that we "measure individual differences with micrometers and treatments with divining rods." We expect that the instructional technologist will eventually make crucial contributions to the ATI paradigm, and subsequently, to educational practice. No other area of education has given more thought to instructional treatments. The concepts contained in the bibliography only suggest that we add two areas to our repertoire: first, a consideration of individual differences, and second, the process of matching students with instructional techniques.

3

-R.E.C.

PERMISSION TO REPRODUCE THIS
COPYRIGHTED MATERIAL BY MICRO-
FICHE ONLY HAS BEEN GRANTED BY

AECT
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION
FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER "

22800911

I. Books, Monographs, and Dissertations

INTRODUCTION TO ATI METHODOLOGY

- Cronbach, L. J. Beyond the two disciplines of scientific psychology. Invited address given at the American Psychological Association Convention, 1974.
- Cronbach, L. J., & Snow, R. E. Individual differences in learning ability as a function of instructional variables. Final report, USOE Contract No. OEC4-6-061269-1217, Stanford University, 1969.
- Cronbach, L. J., & Snow, R. E. *Aptitudes and instructional methods*. New York: Irvington, in press.
- Freeman, F. N. (Ed.) *Visual education*. Chicago: University of Chicago Press, 1924. (Cited in Saettler, P., Design and selection factors. *Review of Educational Research*, 1968; 38(2), 115-128.)
- Hunt, D. E. Person-environment interaction: A challenge found wanting before it was tried. Invited address to the Division of Educational Psychology, American Psychological Association meeting, Montreal, Quebec, August 1973.
- Hunt, D. E., & Sullivan, E. V. *Between psychology and education*. Hinsdale, Ill.: Dryden, 1974.
- Levie, H. W., & Dickie, K. E. The analysis and application of media. In R. M. W. Travers (Ed.), *Second handbook of research on teaching*. Chicago: Rand McNally, 1973. Pp. 858-882.
- Mielke, K. W. Media-message interactions in TV. In G. Salomon & R. E. Snow (Eds.), *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46, 15-31.
- Olson, D. R. Introduction. In D. R. Olson (Ed.), *NSSE Yearbook: Media and symbols, the forms of expression, communication and education*. Chicago: Chicago University Press, 1974.
- Salomon, G. What does it do to Johnny? A cognitive-functionalistic view of research on media. In G. Salomon & R. E. Snow (Eds.), *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46, 33-62.
- Salomon, G. What is learned and how it is taught. The interaction between media, message, task, and learner. In D. Olson (Ed.), *NSSE Yearbook: Media and symbols, the forms of expression, communication and education*. Chicago: The University of Chicago Press, 1974.
- Salomon, G., & Snow, R. E. The specification of film attributes for psychological and educational research purposes *AV Communication Review*, 1968, 16, 225-244.

- Salomon, G., & Snow, R. E. (Eds.) Commentaries on research in instructional media. An examination of conceptual schemes. *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46.
- Snow, R. E. Research on media and aptitudes. In G. Salomon & R. E. Snow. (Eds.), *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46, 63-89.
- Shuiman, L. S. Reconstruction of educational research. *Review of Educational Research*, 1970, 40, 371-396.

APPLICATIONS OF THE ATI APPROACH

- Barker, R. G. Ecological psychology. Stanford, Calif.: Stanford University Press, 1968.
- Becker, A. D. Verbal ability and visual verbal codes of presentation in the acquisition of a poetic concept. Unpublished doctoral dissertation, University of Southern California, 1974.
- Bransford, J. D., & McCarrell, N. S. A sketch of a cognitive approach to comprehension. Some thoughts about understanding what it means to comprehend. In W. B. Weimer & D. S. Palermo (Eds.), *Cognition and the symbolic processes*. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1975. Pp. 189-230.
- Clark, R. E. Predecisional information seeking as a function of interactions between subjective response uncertainty, dogmatism, and locus of control. Unpublished doctoral dissertation, Indiana University, Bloomington, 1970.
- Craik, K. H. Environmental psychology. In P. H. Mussen & M. R. Rosenzweig (Eds.), *Annual review of psychology*. Vol. 24. Palo Alto, Calif.: Annual Reviews Inc., 1973, Pp. 403-422.
- Cronbach, L. J. How can instruction be adapted to individual differences? In R. M. Gagné (Ed.), *Learning and individual differences*. Columbus, Ohio: Charles E. Merrill, 1967. Pp. 23-29.
- Cronbach, L. J. The logic of experiments on discovery. In L. S. Shulman & E. R. Keislar (Eds.), *Learning by discovery. A critical appraisal*. Chicago: Rand McNally, 1966. Pp. 77-92.
- Eckhardt, W. W., Jr. Learning in multi-media programed instruction as a function of aptitude and instruction rate controlled by compressed speech. Unpublished doctoral dissertation, University of Southern California, 1970.
- Gagné, R. M. (Ed.). *Learning and individual differences*. Columbus, Ohio: Charles E. Merrill, 1967.

- Gagné, R. M., & Cropper, G. L. *Individual differences in learning from visual and verbal presentations*. Pittsburgh, Pa.: American Institutes for Research. 1965.
- Hamilton, N. R. *Increasing long-term retention of knowledge. Effects on learning and retention for students of different ability level*. USOE Final-Report Project No. 7-48-7670-204. Palo Alto, Cal.: American Institute for Research. 1965.
- Harvey, O. J., Hunt, D. E., & Schroder, H. M. *Conceptual systems and personality organization*. New York: Wiley. 1961.
- Hawkrige, D. G. Media taxonomies and media selection. Paper prepared for the Institute of Educational Technology, The Open University, Milton Keynes, England. 1973.
- Hunt, D. E. *Matching models in education. The coordination of teaching methods with student characteristics*, Toronto. Ontario Institute for Studies in Education, 1971.
- Hunt, D. E. Alternative approaches in two York County secondary schools, grants-in-aid project. Ontario Ministry of Education, Progress Report, 1972.
- Hunt, D. E. Person-environment interaction. A challenge found wanting before it was tried. Invited address to the *Division of Educational Psychology*, American Psychological Association Meeting, Montreal, Quebec, August 1973.
- Hunt, D. E., Greenwood, J., Brill, R., & Deineka, M. From psychological theory to educational practice: Implementation of a matching model. Symposium on Models of Teaching and Learning, American Educational Research Association, Chicago, Illinois, 1972.
- Joyce, B. R., & Weil, M. *Models of teaching*. Englewood Cliffs, N.J.: Prentice Hall, 1972.
- Kagan, J., & Kogan, N. Individuality and cognitive performance. In P. Mussen (Ed.), *Carmichael's manual of child psychology*. (3rd ed.) New York. John Wiley, 1970. Pp. 1273-1365.
- Kanner, J. H., & McClure, A. H. Varied versus identical repetition in filmed instruction on micrometer reading. Abstracted in A. A. Lumsdaine (Ed.), *Student response in programmed instruction*. Washington, D. C.: National Academy of Sciences-National Research Council. 1961. Pp. 510-512.
- Kropp, R. P., Nelson, W. H., & King, F. J. Identification and definition of subject-matter content variables related to human aptitudes. USOE Cooperative Research Project No. 2914. Tallahassee: Florida State University, 1967. (Unpublished)
- Levie, W. H., & Dickie, K. E. The analysis and application of media. In R. M. W. Travers (Ed.), *Second handbook of research on teaching*. Chicago: Rand McNally, 1973. Pp. 858-882.
- Lumsdaine, A. A. Instruments and media of instruction. In N. L. Gage (Ed.), *Handbook of research on teaching*. Chicago: Rand McNally, 1963. Pp. 583-682.
- Rathbone, C. Teachers' information handling behavior when

grouped with students by conceptual level. Unpublished doctoral dissertation, Syracuse University, 1970.

Rhetts, J. E. Attribute-treatment interactions and individualized instruction. A conceptual framework and example from the project PLAN. In L. Sperry (Ed.), *Learning, performance and individualized differences. Essays and Readings*. Glenview, Ill. Scott Foresman, 1972. Pp. 269-285.

Roshal, S. M. Film-mediated learning with varying representation of the task. Viewing angle, portrayal of demonstration, motion, and student participation. In A. A. Lumsdaine (Ed.), *Student response in programmed instruction*. Washington, D.C.: National Research Council, 1961. Pp. 155-175.

Salomon, G. Heuristic models for the generation of aptitude-treatment interaction hypotheses. *Review of Educational Research*, 1972, 42, 327-343.

Salomon, G. What is learned and how it is taught. The interaction between media, message, task, and learner. In D. Olson (Ed.), *NSSE yearbook. Media and symbols, the forms of expression, communication and education*. Chicago: The University Press, 1974.

Salyachivin, S. Change in international understanding as a function of similarity, conceptual level, and primacy. Unpublished doctoral dissertation, University of Toronto, 1972.

Schroder, H. M. Conceptual complexity and personality organization. In H. M. Schroder & P. Suedfeld (Eds.), *Personality theory and information processing*. New York: Ronald Press, 1971. Pp. 240-274.

Schroder, H. M., Driver, M. J., & Streufert, S. *Human information processing*. New York: Holt, Rinehart and Winston, 1967.

Shavelson, R. J., Berliner, D. C., Bravitch, M. M., & Loading, D. The effects of position and type of question on learning from prose. The interaction of treatments with individual differences in learners. Research and development memorandum No. 98, Stanford Center for Research and Development in Teaching, Stanford University, School of Education, 1972.

Snow, R. E. Research on media and aptitudes. In G. Salomon & R. E. Snow (Eds.), *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46, 63-89.

Thalberg, S. P. An experimental investigation of the relative efficiency of the auditory and visual modes of presentation of verbal material. Unpublished doctoral dissertation, State University of Iowa, 1964.

REVIEWS OF ATI RESEARCH

- Berliner, D. C., & Cahen, L. S. Trait-treatment interaction in learning. In F. N. Kerlinger (Ed.), *Review of research in education*. 1. Itasca, Ill.: F. E. Peacock, 1973. Pp. 58-94.
- Cronbach, L. J., & Snow, R. E. *Aptitudes and instructional methods*. New York: Irvington, in press.
- Gagné, R. M., & Gropper, G. L. Individual differences in learning from visual and verbal presentations. Pittsburgh, Pa.: American Institutes for Research, 1965.
- Hunt, D. E. Person-environment interaction. A challenge found wanting before it was tried. Invited address to the Division of Educational Psychology, American Psychological Association meeting, Montreal, Quebec, August 1973.
- Kagan, J., & Kogan, N. Individuality and cognitive performance. In P. Mussen (Ed.), *Carmichael's manual of child psychology*. (3rd ed.) New York: John Wiley, 1970. Pp. 1273-1365.
- Lesser, G. Postscript: Matching instruction to student characteristics. In G. Lesser (Ed.), *Psychology and educational practice*. New York: Scott Foresman, 1971.
- Levie, H. W., & Dickie, K. E. The analysis and application of media. In R. M. W. Travers (Ed.), *Second handbook of research on teaching*. Chicago: Rand McNally, 1973. Pp. 858-882.
- Salomon, G. What does it do to Johnny? A cognitive functionalistic view of research on media. In G. Salomon & R. E. Snow (Eds.), *Viewpoints* (Bulletin of the School of Education, Indiana University), 1970, 46, 33-62.
- Salomon, G. What is learned and how it is taught. The interaction between media, message, task, and learner. In D. Olson (Ed.), *NSSE Yearbook: Media and symbols, the forms of expression, communication and education*. Chicago: The University of Chicago Press, 1974.

II. Journal Articles and Papers

REVIEWS OF ATI STUDIES

- Ball, B., & Bogatz, G. A. A summary of the major findings in 'The first year of Sesame Street. An evaluation. Princeton, N.J., Educational Testing Service, 1970.
- Campeau, P. L. Selective review of the results of research on the use of audiovisual media to teach adults. *AV Communication Review*, 1974, 22, 5-40.
- Hunt, D. E., & Hardt, R. H. The role of conceptual level and program structure in summer Upward Bound programs. Paper presented at Eastern Psychological Association, Boston, 1967.
- Jamison, D., Suppes, P., & Wells, S. *The effectiveness of alternative instructional media. A survey.* Stanford, Calif., Stanford University, The Graduate School of Business, 1973.
- Koran, M. L. Identification of relevant aptitude variables in TTI (ATI) research. Paper presented at the Symposium on "Trait-treatment interactions in instructional research." American Psychological Association Annual Meeting, Honolulu, 1972.
- Pascal, C. E. Individual differences and preference for instructional methods. *Canadian Journal of Behavioural Science*, 1973, 5, 253-262. Also, Montreal McGill University, 1971. (ED 059 971.)
- Pervin, L. A. Performance and satisfaction as a function of individual-environment fit. *Psychological Bulletin*, 1968, 69, 56-68.
- Rhetts, J. E. Task, learner and treatment variables in instructional design. *Journal of Educational Psychology*, 1974, 66(3), 339-347.
- Skanes, G. R., Sullivan, A. M., Rowe, E. J., & Shannon, E. Intelligence and transfer. Aptitude by treatment interactions. *Journal of Educational Psychology*, 1974, 66, 563-568.
- Snow, R. E., & Salomon, G. Aptitudes and instructional media. *AV Communication Review*, 1968, 16, 341-357.
- Tobias, S. Review of the response mode issue. *Review of Educational Research*, 1973, 43, 193-204.
- Vale, J. R., & Vale, C. A. Individual differences and general laws in psychology: A reconciliation. *American Psychologist*, 1969, 24, 1093-1108.

ATI THEORY AND METHODOLOGY

- Allen, W. H. Instructional media research. Past, present and future. *AV Communication Review*, 1971, 19, 9-18.

- Allen, W. H. Intellectual abilities and instructional media design. *AV Communication Review*, 1975, 23, 130-170.
- Anderson, R. C. Educational psychology. *Annual Review of Psychology*, 1967, 18, 103-164.
- Ausubel, D. P. *Educational psychology. A cognitive view*. New York: Holt, Rinehart & Winston, 1968.
- Bell, R. Q. A reinterpretation of the direction of effects in studies of socialization. *Psychological Bulletin*, 1968, 75, 81-95.
- Bracht, G. H., & Glass, G. V. The external validity of experiments. *American Educational Research Journal*, 1968, 5, 437-474.
- Buss, A. R. A general developmental model for interindividual differences, intraindividual differences and intraindividual changes. *Developmental Psychology*, 1974, 10, 70-78.
- Campbell, D. T., & Fiske, D. W. Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 1959, 56, 81-105.
- Clark, R. E. Constructing a taxonomy of media attributes for research purposes. *AV Communication Review*, 1975, 23, 197-215.
- Cronbach, L. J. The two disciplines of scientific psychology. *American Psychologist*, 1957, 12, 671-684.
- Di Vesta, F. J. An evolving theory of instruction. *Educational Technology*, 1972, 12(12), 34-39.
- Di Vesta, F. J. Theory and measures of individual differences in studies of trait by treatment interaction. *Educational Psychologist*, 1973, 13(1), 5-12.
- Di Vesta, F. J. Cognitive structures and symbolic processes. *Teachers College Record*, 1974, 75(3), 357-370.
- Di Vesta, F. J. Trait-treatment interactions, cognitive processes, and research on communication media. *AV Communication Review*, 1975, 23, 185-196.
- Frederick, W. C., Blount, N. S., & Johnson, S. L. A comparison of verbal statement-symbolic notation, and figural representation of grammar concepts. Unpublished manuscript. University of Wisconsin. Center for Cognitive Learning, 1968.
- Frederiksen, N. Toward a taxonomy of situations. *American Psychologist*, 1972, 2, 114-123.
- Gibson, J. J. A theory of pictorial perception. *AV Communication Review*, 1954, 2, 2-23.
- Glaser, R. Individuals and learning. The new aptitudes. *Educational Researcher*, 1972, 1(6), 5-13.
- Harootunyan, B. Extrapolating from aptitude-treatment interaction models. Paper presented at American Educational Research Association meeting. New Orleans, February 1973.
- Koran, M. L. Identification of relevant aptitude variables in TTI (ATI) research. Paper presented at the Symposium on "Trait-treatment interactions in instructional research." American Psychological Association Annual Meeting, Honolulu, 1972.

- McLachlan, J. F. C. Benefit from group therapy as a function of patient therapist match on conceptual level. *Psychotherapy, Theory, Research and Practice*, 1972, 9, 317-323.
- Meredith, P. Toward a taxonomy of educational media. *AV Communication Review*, 1965, 13, 374-384.
- Merrill, M. D. Learner control Beyond aptitude-treatment interactions. *AV Communication Review*, 1975, 23, 217-226.
- Mielke, K. W. Asking the right ETV questions. *Educational Broadcasting Review*, 1968, 2(6), 54-61.
- Mitchell, J. V. Education's challenge to psychology The prediction of behavior from person-environment interactions. *Review of Educational Research*, 1969, 39, 695-722.
- Page, C. R., & Stern, G. G. An approach to the measurement of psychological characteristics of college environments. *Journal of Educational Psychology*, 1958, 49, 269-277.
- Parkhurst, P. E. Generating meaningful hypotheses with aptitude-treatment interactions. *AV Communication Review*, 1975, 23, 171-183.
- Pervin, L. A. Performance and satisfaction as a function of individual-environment fit. *Psychological Bulletin*, 1968, 69, 56-68.
- Rhetts, J. E. Task, learner, and treatment variables. *Journal of Educational Psychology*, 1974, 66, 339-347.
- Salomon, G. Can we affect cognitive skills through visual media? An hypothesis and initial findings. *AV Communication Review*, 1972, 20, 401-422.
- Salomon, G., & Clark, R. E. Re-examining the methodology of research on media and technology in education. Unpublished manuscript, The Hebrew University of Jerusalem, Jerusalem, Israel, April 1974. (Prepublication draft.) ED 098 971
- Schwen, T. M. Learner analysis Some process and content concerns. *AV Communication Review*, 1973, 21, 44-72.
- Sells, S. B. *Stimulus determinants of behavior*. New York: Ronald Press, 1963. (b)
- Shapiro, K. R. An overview of problems encountered in aptitude-treatment interaction (ATI) research for instruction. *AV Communication Review*, 1975, 23, 227-241.
- Shulman, L. S. Reconstruction of educational research. *Review of Educational Research*, 1970, 40, 371-396.
- Snow, R. E. Representative and quasi representative designs for research on teaching. Address to the annual meeting of the Division of Measurement and Methodology. American Educational Research Association, New Orleans, February 1973.
- Snow, R. E., & Salomon, G. Aptitudes and instructional media. *AV Communication Review*, 1968, 16, 341-357.
- Stern, G. E. *People in context*. New York: Wiley, 1970.
- Vale, J. R., & Vale, C. A. Individual differences and general laws in psychology. A reconciliation. *American Psychologist*, 1969, 24, 1093-1108.

CRITIQUES OF THE ATI APPROACH

- Bracht, G. H. Experimental factors related to aptitude-treatment interactions. *Review of Educational Research* 1970, 40, 627-645.
- Jackson, P. W. Is there a best way of teaching Harold Bateman? *Midway*, 1970, 10, 15-28.
- Jamison, D., Suppes, P., & Wells, S. *The effectiveness of alternative instructional media: A survey*. Stanford, Calif., Stanford University, The Graduate School of Business, 1973.
- McKeachie, W. J. The decline and fall of the laws of learning. *Educational Researcher*, 1974, 3(3), 7-11.
- Merrill, M. D. Learner control: Beyond aptitude treatment interactions. *AV Communication Review*, 1975, 23, (2), 217-226.

ATI RESEARCH REPORTS

Visual and Verbal Learning Research

- Allen, W. H., Cooney, S. M., & Weintraub, R. *Audio implementation of still and motion pictures*. USOE Final Report, Project No. 5-0741. Los Angeles: University of Southern California, Research Division, Department of Cinema, 1968.
- Allen, W. H., Daehling, W. A., Russell, J. J. IV., & Nielsen, T. G. *Effectiveness of different combinations of visual and verbal presentation modes in teaching different kinds of learning tasks*. USOE Final Report, Project No. 6-1265. Los Angeles: University of Southern California, Research Division, Department of Cinema, 1970.
- Allen, W. H., Filep, R. F., & Cooney, S. M. *Visual and audio presentation of machine-programmed instruction*. USOE Final Report, Project No. 5-0724-2-12-1. Los Angeles: University of Southern California, Research Division, Department of Cinema, 1967.
- Allen, W. H., & Weintraub, R. *The motion variables in film presentation*. USOE Final Report, Project No. 5-1123. Los Angeles: University of Southern California, Research Division, Department of Cinema, 1968.
- Ausubel, D. P., & Fitzgerald, D. Organizer, general background, and antecedent learning in sequential verbal learning. *Journal of Educational Psychology*, 1962, 53, 243-259.
- Bourisseau, W., Davis, O. L. Jr., & Yamamoto, K. Sense-impression responses of Negro and white children to verbal and pictorial stimuli. *AV Communication Review*, 1967, 15, 259-268.
- Carpenter, C. R. A theoretical orientation for instructional film research. *AV Communication Review*, 1953, 1, 38-52.
- Carterette, E. C., & Jones, M. H. Visual and auditory information processing in children and adults. *Science*, 1967, 156, 986-988.

- Cooper, J. C., Jr., & Gaeth, J. H. Interactions of modality with age and with meaningfulness in verbal learning. *Journal of Educational Psychology*, 1967, 58, 41-44.
- Dilley, M., & Paivio, A. Pictures and words as stimulus and response items in paired associate learning of young children. *Journal of Experimental Child Psychology*, 1968, 6, 231-240.
- Fairley, F. H., & Grant, A. D. Arousal and reminiscence in learning from color and black-white audiovisual presentations. Paper presented at the American Educational Research Association annual meeting, New Orleans, February-March 1973. (ERIC ED 073 680.)
- Feldman, D. H. Map understanding as a possible crystalizer of cognitive structures. *American Educational Research Journal*, 1971, 8, 485-503.
- Fleming, M. Classification and analysis of instructional illustrations. *AV Communication Review*, 1967, 15, 246-258.
- Guba, E., Wolf, W., DeGroot, S., Knemeyer, M., VanAtta, R., & Light, L. Eye movements in TV viewing in children. *AV Communication Review*, 1964, 12, 386-401.
- Ingersoll, G., & Di Vesta, F. J. Effects of modality preferences on performance on a bi-sensory missing units task. *Journal of Experimental Psychology*, 1972, 93(2), 386-391.
- Jamison, D., Suppes, P., & Wells, S. *The effectiveness of alternative instructional media: A survey*. Stanford, Calif.: Stanford University, The Graduate School of Business, 1973.
- Jenkins, J. R., Stack, W. B., & Deno, S. L. Children's recognition and recall of picture and word stimuli. *AV Communication Review*, 1969, 17, 265-271.
- Kanner, J. H., & Rosenstein, A. J. Television and army training. Color vs. black and white. *AV Communication Review*, 1960, 8, 243-252.
- Marantz, S., & Dowaliby, F. Filmed versus lecture methods of instruction as related to imaginability. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, 1973.
- Michael D. N., & Maccoby, N. Factors influencing the effects of student participation on verbal learning from films. Motivating versus practice effects, "feedback," and overt versus covert responding. In A. A. Lumsdaine (Ed.), *Student response in programmed instruction*. Washington, D. C.: National Academy of Sciences-National Research Council, 1961. Pp. 271-293.
- Radlow, R. *The relation of some measures of ability to measures of learning from sound motion pictures*. Instructional Film Research Program, Pennsylvania State University, Technical Report SPECDEVCEEN 269-7-58. Port Washington, L.I., N.Y.: U.S. Navy Training Devices Center, 1955.
- Salomon, G. Cognitive effects of media: The case of Sesame Street in Israel. Address to the biannual meeting of the International Society for the Study of Behavioral Development, Ann Arbor,

August 1973.

- Schulz, R. W., & Kasschau, R. A. Serial learning as a function of meaningfulness and mode of presentation with audio and visual stimuli of equivalent duration. *Journal of Experimental Psychology*, 1966, 71, 350-354.
- Segal, S. J., & Fusella, V. Influence of imaged pictures and sounds on detection of visual and auditory signals. *Journal of Experimental Psychology*, 1970, 83(3), 458-464.
- Snow, R. E., Tiffin, J., & Seibert, W. F. Individual differences and instructional film effects. *Journal of Educational Psychology*, 1965, 56, 315-326.
- Stevenson, H. W., & Siegel, A. Effects of instruction and age on retention of filmed content. *Journal of Educational Psychology*, 1969, 60(1), 71-74.

Developmental Learning Studies

- Allen, W. H., Filep, R. F., & Cooney, S. M. Visual and audio presentation of machine-programmed instruction. USOE Final Report. Project No. 5-0724-02-12-1. Los Angeles. University of Southern California, Research Division, Department of Cinema. 1967.
- Cross, H. J. The relation of parental training conditions to conceptual level in adolescent boys. *Journal of Personality*, 1966, 34, 348-365.
- Elkind, D., Koçglër, R., & Go, E. Studies in perceptual development. II. Part-whole perception. *Child Development*, 1964, 35, 81-90.
- Feldman, D. H. Map understanding as a possible crystalizer of cognitive structures. *American Educational Research Journal*, 1971, 8, 485-503.

CAI and Programed Instruction

- Abramson, T., & Kagen, E. Familiarization of content and different response modes in programmed instruction. *Journal of Educational Psychology*, 1975, 67, 83-88.
- Brown, J. L. Effects of logical and scrambled sequences in mathematical materials on learning with programmed instruction materials. *Journal of Educational Psychology*, 1970, 61, 41-45.
- Campeau, P. L. Level of anxiety and presence or absence of feedback in programmed instruction. USOE, NDEA Title VII Project No. 1155. Palo Alto, Calif.. American Institutes for Research, February 1965.
- Doty, B., & Doty, L. A. Programmed instructional effectiveness in relation to certain student characteristics. *Journal of Educational Psychology*, 1964, 334-338.

- Gropper, G. L., & Kress, G. C., Jr. Individualizing instruction through pacing procedures. *AV Communication Review*, 1965, 13, 165-182.
- Knight, H. R., & Sassenrath, J. M. Relation of achievement motivation and test anxiety to performance in programmed instruction. *Journal of Educational Psychology*, 1966, 57, 14-17.
- Lublin, S. C. Reinforcement schedules, scholastic aptitude, autonomy need, and achievement in a programmed course. *Journal of Educational Psychology*, 1965, 56, 295-302.
- Tobias, S. Review of the response mode issue. *Review of Educational Research*, 1973, 43, 193-204.
- Tobias, S., & Abramson, T. Interaction among anxiety, stress, response mode and familiarity of subject matter on achievement from programmed instruction. *Journal of Educational Psychology*, 1971, 62, 357-364.

Instructional Techniques

- Allen, D. I. Some effects of advance organizers and level of questions on the learning and retention of written social studies material. *Journal of Educational Psychology*, 1970, 61, 333-339.
- Grippin, P. C. Field independence and reflection-impulsivity as mediators of performance on a programmed learning task with and without strong prompts. *Proceedings of the 81st Annual Convention of the American Psychological Association, Montreal, Canada*, 1973, 8, 619-620.
- James, N. E. Personal preference for method as a factor in learning. *Journal of Educational Psychology*, 1962, 53, 43-47.
- Koran, M. L., Snow, R., & McDonald, F. J. Teacher aptitude in observational learning of a teaching skill. *Journal of Educational Psychology*, 1971, 62, 219-228.
- McLachlan, J. F. C., & Hunt, D. E. Differential effects of discovery learning as a function of conceptual level. *Canadian Journal of Behavioural Science*, 1973, 5, 152-160.
- Peterson, J. C., & Hancock, R. R. Developing mathematical materials for the student's cognitive style. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, February 1973. ERIC ED 076 423.
- Peterson, J. C., & Hancock, R. R. Developing mathematical materials for aptitude-treatment interaction. Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 1974.
- Salomon, G., & Sieber, J. E. Relative subjective response uncertainty as function of stimulus-task interaction. *American Educational Research Journal*, 1970, 7, 337-350.
- Tomlinson, P. D., & Hunt, D. E. Differential effects of rule-example order as a function of conceptual level. *Canadian Journal of Behavioural Science*, 1971, 3, 237-245.

APPLICATIONS OF ATI RESEARCH TO THE DESIGN OF INSTRUCTION

- Allen, W. H. Intellectual abilities and instructional media design. *AV Communication Review*, 1975, 23, 139-170.
- Buckland, P. R. The response in a linear program. Its mode and importance. *Programmed Learning and Educational Technology*, 1967, 4 (February), 47-51.
- Bunderson, C. V. Team production of learner-controlled courseware: A progress report. *International Journal of Man-Machine Studies*, 1974, 6, 479-491.
- Bunderson, C. V. The TICCIT project. Design strategy for educational technologies. *Proceedings of Educational Technologies Symposium at Stony Brook, New York*, 1973.
- Clark, R. E. Planning instructional media. An alternative approach. *The Urban Review*, 1972, 6(2), 30-33.
- Dwyer, F. M. Adapting visual illustrations for effective learning. *Harvard Educational Review*, 1967, 37, 250-263.
- Fleming, M. Classification and analysis of instructional illustrations. *AV Communication Review*, 1967, 15, 246-258.
- Hunt, D. E. Education for interdisciplinary understanding. *The Behavioral Science Teacher*, 1973, 1, Fall.
- Hunt, D. E., & Hardt, R. H. The role of conceptual level and program structure in summer Upward Bound programs. Paper presented at Eastern Psychological Association, Boston, 1967.
- Hunt, D. E., & Joyce, B. E. Teacher trainee personality and initial teaching style. *American Educational Research Journal*, 1967, 4, 253-259.
- Salomon, G. Cognitive effects of media: The case of Sesame Street in Israel. Address to the biannual meeting of the International Society for the Study of Behavioral Development, Ann Arbor, August 1973.
- Sells, S. B. An interactionist looks at the environment. *American Psychologist*, 1963, 18, 696-702; (a)